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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/472,757	12/27/1999	ROBERT J. O'DONNELL	LAM133/P0582	9169

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EXAMINER
UMEZ ERONINI, LYNETTE T

ART UNIT	PAPER NUMBER
1765	11

DATE MAILED: 07/31/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/472,757	Applicant(s) O DONNELL, ROBERT J.
	Examiner Lynette T. Umez-Eronini	Art Unit 1765

-- The MAILING DATE of this communication appears on the cover sh et with the correspondence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15,17 and 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15 and 17-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1- 5, 15, 17 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Hsieh et al. (US 5,776,832).

Hsieh teaches applying a photoresist to a substrate, which is exposed through an etch mask **20** and forming the etch mask over portions of a metal layer **18** where the metal conducting lines are desired (column 4, line 60 – column 5, line 2), which reads on, a method for etching partially through a metal-containing layer disposed above a substrate, wherein part of the said metal-containing layer is disposed below an etch mask and part of the said metal-containing layer is not disposed below the etch mask.

The method comprises:

anisotropically plasma etching the metal layer in a reactive ion etcher (column 5, lines 9-17) by using a chlorine-containing gas or gas mixtures such as BCl_3 and Cl_2, which results in the formation of $AlCl_3$ on the Al sidewalls (same as applicant's residual sidewall passivation), (column 3, lines 9-13) and metal side wall polymer (column 3, lines 24-26) reads on the method comprises the steps of:

placing the substrate in an etch chamber;

flowing and etchant gas into the etch chamber;

creating a plasma form the etchant gas in the etch chamber; and

etching away parts of the metal-containing layer not disposed below the etch masks, wherein some of the etched away parts of the metal-containing layer is redeposited to form residual sidewall passivation while the substrate is in the etch chamber.

Table 1 shows the etching flow rate and time of the etching gases are set at zero when oxygen ashing is being carried out (column 5, lines 29-48), which reads on,

discontinuing the flow of the etchant gas into the etch chamber.

Insitu oxygen plasma ashing is carried out in the same etching chamber after etching the metal lines and prior to removing the wafers (column 3, lines 16-19) and under pressure using pure oxygen and at a flow rate as specified in Table 1 (column 5, lines 53-56). This in-situ oxygen ashing in the same etching chamber passivates the aluminum sidewalls by reducing chorine on the an aluminum sidewalls with oxygen and partially strips the photoresist (column 3, lines 17-21 and 24-25), which reads on:

flowing the etch mask stripping gas in the etch chamber;

creating a plasma form the etch mask stripping gas into the etch chamber; and

stripping away the etch mask and removing some residual sidewall passivation, while the substrate is in the etch chamber; and

removing the substrate from the etch chamber.

It is noted that Hsieh method of ashing the aluminum sidewalls (same as applicant's residual sidewall passivation), passivates the layer by reducing chlorine on

the aluminum sidewalls with oxygen, which would result in a passivated (aluminum oxide) layer which free of $AlCl_3$ and thereby read on removing some residual sidewall passivation.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh (US '832) as applied to claim 1 above, and further in view of Fukuyama et al. (US 5,770,100).

Hsieh differs in failing to teach:

placing the substrate in and removing the substrate from a load lock, **in claim 6** and

placing the substrate into a corrosion passivation chamber after the substrate has been removed from the etch chamber, and exposing the wafer to a non-plasma high temperature water vapor, **in claim 7**.

Fukuyama teaches an anticorrosion treatment using a load lock system (Figure 1) to transfer a wafer from an etching chamber to a post-etch treatment chamber **8**, where anticorrosion treatment of sample is carried out using vaporized gas of water (column 3, line 61 – column 4, line 21 and column 8, lines 41-54).

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Hsieh by moving and removing the substrate from a load lock, placing a sample into a corrosion passivation chamber after the substrate has been removed from the etch chamber and carrying out the anticorrosion passivation in as taught by Fukuyama for the purpose of preventing contamination in the processing chamber.

5. Claims 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh ('832) in view of view of Fukuyama ('100) as applied to claim 1 above, and further in and Tepman et al. (US 5,186,718).

Hsieh in view of Fukuyama differs in failing to teach: transferring the substrate from the corrosion passivation chamber to a cooling station; cooling the substrate in the cooling station; and transferring the substrate from the cooling station to the load lock, **in claim 8**.

Tepman teaches using the load lock system for transferring wafers and using either post etching chamber **26** and **27** for cooling wafers following treating in a processing chambers **34** (column 4, lines 23-29). It is noted that the processing chambers **34** is not limited to only etching and ashing. Other processes such as anti-corrosion treatment can be performed in chambers **34**.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Hsieh in view of Fukuyama by using a load lock system to transfer a substrate from a processing chamber to a cooling station and to a load lock

as taught by Tepman for the purpose of preventing contamination in the processing chamber.

6. Claims 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh ('832) in view of view of Fukuyama ('100) and further in and Tepman ('718) as applied to claim 1 above.

Hsieh in view of Fukuyama ('100) and further in and Tepman differs in failing to specify processing variables such as the etchant pressure of 1 and 80 millitorr during the stripping step, as recited **in claims 9 and 12** and a bias power between –10 and –1000 volts during the step of electrostatically attracting the plasma form the etchant gas and the stripping gas, **as in claims 11 and 14**; and the substrate at a temperature between 10 and 100° C, **as in claims 10 and 13**.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Hsieh in view of Fukuyama and further in view of Tepman by employing any of a variety of operational variables such as temperature and pressure as claimed by the applicant. They are well-known variables in the etching art and known to affect both the rate and quality of the etching process. Conducting routine experimentation for the purpose of obtaining the best polymeric composition would optimize the selection of a particular value. Changes in temperature, concentrations, or other process conditions of an old process do not impart patentability unless the recited ranges are critical, i.e., they produce a new and unexpected result. *In re Aller et al.*, 105 USPQ 233.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner can normally be reached on Second Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703-972-9310 for regular communications and 703-972-9311 for After Final communications.

ltue
July 25, 2002

FELISA HITESHEW
PRIMARY EXAMINER
AU 1765